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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/943,131	08/31/2001	Julian Norley	P-1048	9247

7590 10/21/2003  
Advanced Energy Technology Inc  
12900 Snow Road  
Parma, OH 44130

EXAMINER
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BAHTA, ABRAHAM

ART UNIT	PAPER NUMBER
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1775

DATE MAILED: 10/21/2003

12

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/943,131	<b>Applicant(s)</b> NORLEY ET AL.	
	<b>Examiner</b> Abraham Bahta	<b>Art Unit</b> 1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 October 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 and 17-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 17-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All   b) ☐ Some \*   c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Shane 3,404,061.

Shane teaches a laminated graphite sheet in which the sheet of material may be impregnated with various amounts of polymeric material such as an epoxy resin. See col. 13, lines 59-74, col. 15, lines 1- 11. The graphite material may be compressed at elevated temperature of up to 1000 °C. See col. 11, lines 22-40. Further, a heat curable impregnant or binder such as phenolic resin may be utilized. See col. 13, lines 66-74.

Shane does not require a resin content less than 30% by weight; however, since Shane discloses the resin content may be about 30% by weight and that the flexible graphite sheet may be impregnated with various amounts of polymeric material, (see col. 7, lines 17-21 and col. 13, lines 59-74) it would have been obvious to one of ordinary skill in the art at the time of the invention to vary the content of the resin in order to manufacture a laminated graphite sheet having the desired characteristics such as mechanical strength, thermal conductivity, degree of anisotropy, density and thickness depending on the ultimate use of the product. In addition, it has

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been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

Concerning claims 4-5, Shane does not require a pressure of from 1000 psi to 5000 psi; however, the reference at col. 4, lines 60-62 suggests the density and thickness of the sheet material can be varied by controlling the degree of compression.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ the desired pressure and temperature to the graphite sheet material in order to obtain the desired thickness and density depending on the application for which the product is intended.

***Claim Rejections - 35 USC § 103***

Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shane et al '061.

Shane teaches a laminated graphite sheet in which the sheet of material may be impregnated with various amounts of polymeric material such as an epoxy resin. See col. 13, lines 59-66. The graphite material may be compressed at elevated temperature of up to 1000°C. See col. 11, lines 22-40. Further, Shane teaches the laminated graphite sheet may include non-graphite materials such as aluminum and copper. See col. 5, lines 7-16. Further, a heat curable impregnant or binder such as phenolic resin may be utilized. See col. 13, lines 66-74.

Shane does not require a resin content less than 30% by weight; however, since Shane discloses the resin content may be about 30% by weight and that the flexible graphite sheet may

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be impregnated with various amounts of polymeric material, (see col. 7, lines 17-21 and col. 13, lines 59-74) it would have been obvious to one of ordinary skill in the art at the time of the invention to vary the content of the resin in order to manufacture a laminated graphite sheet having the desired characteristics.

Regarding claim 9, Shane does not require a temperature of below 200°C and a pressure of below about 5000 psi; however, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to vary the temperature and pressure in order to achieve a flexible graphite sheet material having the desired surface properties including density, mechanical strength, thermal conductivity, degree anisotropy depending on the ultimate use of the product.

***Claim Rejections - 35 USC § 103***

Claims 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shane et al '061.

Shane teaches a laminated graphite sheet in which the sheet of material may be impregnated with various amounts of polymeric material such as an epoxy resin. See col. 13, lines 59-66. The graphite material may be compressed at elevated temperature of up to 1000°C. See col. 11, lines 22-40. Further, Shane teaches the laminated graphite sheet may include non-graphite materials such as aluminum and copper. See col. 5, lines 7-16. Further, a heat curable impregnant or binder such as phenolic resin may be utilized. See col. 13, lines 66-74. In addition, the reference teaches the graphite sheet material may possess or exhibit thermal conductivity, thermal insulating properties and anisotropic electrical properties. See col. 13, lines 16-26.

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Shane does not require a resin content less than 30% by weight; however, since Shane discloses the resin content may be about 30% by weight and that the flexible graphite sheet may be impregnated with various amounts of polymeric material, (see col. 7, lines 17-21 and col. 13, lines 59-74) it would have been obvious to one of ordinary skill in the art at the time of the invention to vary the content of the resin in order to manufacture a laminated graphite sheet having the desired characteristics such as thermal conductivity, density, mechanical strength, degree of anisotropy depending on the ultimate use of the product. In addition, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

Concerning claims 11-15, Shane does not require a pressure of 1000 to 5000 psi; however, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to vary the temperature and pressure in order to achieve the desired thickness and density.

Regarding claims 12-13, Shane does not require a thermal conductivity greater than 100 W/mC; however, Shane teaches the thermal conductivity of the graphite sheet material in "a" direction may be in the range of 140-150 Btu. See col. 13, lines 16-24. It would have been obvious to one of ordinary skill in the art at the time the invention was made to vary the curing temperature and pressure in order to achieve the desired thermal conductivity, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art.

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Regarding claim 14, the reference does not require the specific density recited in claim 14, however, the reference at col. 4, lines 60-62 suggests the density and thickness of the sheet material can be varied by controlling the degree of compression.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ the desired pressure to the graphite sheet of material in order to obtain the desired thickness and density as taught by Shane.

Regarding claim 15, the reference does not require a resin content of 3% by weight; however, the reference at col. 10, lines 23-27 suggests the graphite sheet of material may be impregnated with suitable impregnant or additives such as epoxy resin of about 30% by weight. See col. 7, lines 17-18. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ the desired content of a resin in order to modify the nature or properties of the graphite sheet material depending on the final use of the product.

***Claim Rejections - 35 USC § 103***

Claims 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shane et al '061.

Shane teaches a resin impregnated flexible graphite sheet material wherein the sheet of material possesses anisotropic electrical, thermal insulating and thermal conductivity properties. See col. 13, lines 16-30. The resin may be epoxy resin. See col., lines 56-74.

Shane does not require thermal conductivity of greater than about 300 W/mC and a thermal conductivity of less than about 10 W/mC in an in plane direction and in an out of plane

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direction respectively; however, Shane in several embodiments suggests the graphite sheet material may be modified to achieve the desired properties of the material. For example, Shane discloses the density and thickness of the sheet material can be varied by controlling the degree of compression (col. 4, lines 6-62); the degree of anisotropy may be increased with increasing density (col. 4, lines 66-69); impregnants or additives such as metal powder, clay, organic polymeric materials and the like can be incorporated or mixed with the graphite composition to form the desired sheet material (col. 5, lines 1-6); the temperature in which the graphite material is cured may be varied to modify the graphite sheet material (col. 11, lines 22-26) and the graphite sheet material may be modified to possess either low or high thermal conductivity (col. 13, lines 9-10).

Given the above teaching, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the graphite sheet material to possess the desired thermal conductivity depending on the ultimate use of the product.

Shane does not require a resin content less than 30% by weight; however, since Shane discloses the resin content may be about 30% by weight and that the flexible graphite sheet may be impregnated with various amounts of polymeric material, (see col. 7, lines 17-21 and col. 13, lines 59-74) it would have been obvious to one of ordinary skill in the art at the time of the invention to vary the content of the resin in order to manufacture a laminated graphite sheet having the desired characteristics. In addition, it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.



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Regarding claim 19, the reference does not require the specific density recited in claim 19, however, the reference at col. 4, lines 60-62 suggests the density and thickness of the sheet material can be varied by controlling the degree of compression.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ the desired pressure to the graphite sheet of material in order to obtain the desired thickness and density as taught by Shane.

#### **Response to Applicant's arguments**

The applicant admits that Shane teaches production of graphite sheet by compressing the sheet to a desired thickness and density, then subjecting the sheet to elevated temperature to remove residual fluid in the sheet and cause re-expansion of unexpanded particles, then recompressing the sheet; however, the applicant then argues Shane et al does not teach compression at elevated temperature. The Examiner disagrees. The Examiner contends, as admitted by the applicant, Shane teaches in order to further insure the production of a smooth sheet of uniform thickness and density, the sheet material, after pressed or molded to the desired thickness and density, can be subjected to a suitable elevated temperature. The Examiner contends the fact remains that Shane's graphite sheet may be formed in the form of a laminate (col. 5, lines 17-22) and is cured at high temperature. See col. 11, lines 22-26. Further, the applicant argues since the purpose for exposing the flexible graphite sheet to elevated temperature in Shane is to both remove residual fluid and cause re-expansion of compressed particles, the sheet could not, by definition have been impregnated. The Examiner disagrees. As discussed above, it is clear Shane

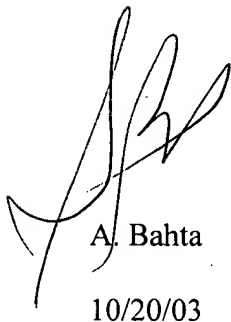
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discloses the graphite material may be impregnated with a resin. Further, the reference at col. 13, line 66 through col. 14, line 3 teaches when a heat-curable impregnant or binder, for example, a phenolic resin is utilized, the binder can be cured or hardened by suitably heating the compressed product.

Any inquiry concerning this communication should be directed to Abraham Bahta at telephone number (703) 308-4412. The Examiner can normally be reached Monday-Friday from 11:30 AM -8:00 PM (EST).

If attempts to reach the Examiner by telephone are unsuccessful, the examiner's supervisor Deborah Jones can be reached on (703) 308-3822. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for after Final communications.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.



A. Bahta  
10/20/03



DEBORAH JONES  
SUPERVISORY PATENT EXAMINER